

**IN THE UNITED STATES DISTRICT COURT  
FOR THE EASTERN DISTRICT OF TEXAS  
MARSHALL DIVISION**

GODO KAISHA IP BRIDGE 1,	§	
	§	
Plaintiff,	§	
	§	
v.	§	
	§	NO. 2:21-CV-00213-JRG
TELEFONAKTIEBOLAGET LM	§	(lead case)
ERICSSON and ERICSSON INC.,	§	
	§	
Defendants.	§	
<hr/>		
GODO KAISHA IP BRIDGE 1,	§	
	§	
Plaintiff,	§	
	§	
v.	§	NO. 2:21-CV-00215-JRG
	§	(member case)
NOKIA SOLUTIONS AND NETWORKS	§	
OY, and NOKIA OF AMERICA CORP.,	§	
	§	
Defendants.	§	

**CLAIM CONSTRUCTION ORDER**

In these consolidated patent cases, Plaintiff Godo Kaisha IP Bridge 1 asserts claims from eight patents against Telefonaktiebolaget LM Ericsson, Ericsson Inc., Nokia Solutions and Networks Oy, and Nokia of America Corp. For claim-construction purposes, however, only five of the eight patents are at issue: U.S. Patents 7,372,909; 8,077,594; 8,085,724; 8,385,239; and 9,137,000. Generally, the five patents relate to wireless communications systems, such as those used to implement mobile phone networks.

Having considered the parties' briefing, along with arguments of counsel during an April 25, 2022 hearing, the Court resolves the disputes as follows.

## I. LEGAL STANDARDS

### A. Generally

“[T]he claims of a patent define the invention to which the patentee is entitled the right to exclude.” *Phillips v. AWH Corp.*, 415 F.3d 1303, 1312 (Fed. Cir. 2005) (en banc) (quoting *Innova/Pure-Water, Inc. v. Safari Water Filtration Sys., Inc.*, 381 F.3d 1111, 1115 (Fed. Cir. 2004)). As such, if the parties dispute the scope of the claims, the court must determine their meaning. *See, e.g., Verizon Servs. Corp. v. Vonage Holdings Corp.*, 503 F.3d 1295, 1317 (Fed. Cir. 2007); *see also Markman v. Westview Instruments, Inc.*, 517 U.S. 370, 390 (1996), aff’g, 52 F.3d 967, 976 (Fed. Cir. 1995) (en banc).

Claim construction, however, “is not an obligatory exercise in redundancy.” *U.S. Surgical Corp. v. Ethicon, Inc.*, 103 F.3d 1554, 1568 (Fed. Cir. 1997). Rather, “[c]laim construction is a matter of [resolving] disputed meanings and technical scope, to clarify and when necessary to explain what the patentee covered by the claims . . . .” *Id.* A court need not “repeat or restate every claim term in order to comply with the ruling that claim construction is for the court.” *Id.*

When construing claims, “[t]here is a heavy presumption that claim terms are to be given their ordinary and customary meaning.” *Aventis Pharm. Inc. v. Amino Chems. Ltd.*, 715 F.3d 1363, 1373 (Fed. Cir. 2013) (citing *Phillips*, 415 F.3d at 1312–13). Courts must therefore “look to the words of the claims themselves . . . to define the scope of the patented invention.” *Id.* (citations omitted). “[T]he ordinary and customary meaning of a claim term is the meaning that the term would have to a person of ordinary skill in the art in question at the time of the invention, i.e., as of the effective filing date of the patent application.” *Phillips*, 415 F.3d at 1313. This “person of

ordinary skill in the art is deemed to read the claim term not only in the context of the particular claim in which the disputed term appears, but in the context of the entire patent, including the specification.” *Id.*

Intrinsic evidence is the primary resource for claim construction. *See Power-One, Inc. v. Artesyn Techs., Inc.*, 599 F.3d 1343, 1348 (Fed. Cir. 2010) (citing *Phillips*, 415 F.3d at 1312). For certain claim terms, “the ordinary meaning of claim language as understood by a person of skill in the art may be readily apparent even to lay judges, and claim construction in such cases involves little more than the application of the widely accepted meaning of commonly understood words.” *Phillips*, 415 F.3d at 1314; *see also Medrad, Inc. v. MRI Devices Corp.*, 401 F.3d 1313, 1319 (Fed. Cir. 2005) (“We cannot look at the ordinary meaning of the term . . . in a vacuum. Rather, we must look at the ordinary meaning in the context of the written description and the prosecution history.”). But for claim terms with less-apparent meanings, courts consider ““those sources available to the public that show what a person of skill in the art would have understood disputed claim language to mean[,] [including] the words of the claims themselves, the remainder of the specification, the prosecution history, and extrinsic evidence concerning relevant scientific principles, the meaning of technical terms, and the state of the art.”” *Phillips*, 415 F.3d at 1314 (quoting *Innova*, 381 F.3d at 1116).

## B. Indefiniteness

“[A] patent is invalid for indefiniteness if its claims, read in light of the specification delineating the patent, and the prosecution history, fail to inform, with reasonable certainty, those skilled in the art about the scope of the invention.” *Nautilus, Inc. v. Biosig Instruments, Inc.*, 572 U.S. 898, 901 (2014). “A patent must be precise enough to afford clear notice of what is claimed,” but that consideration must be made while accounting for the inherent limitations of language. *Id.*

at 908–09. “Indefiniteness must be proven by clear and convincing evidence.” *Sonix Tech. Co. v. Publ’ns Int’l, Ltd.*, 844 F.3d 1370, 1377 (Fed. Cir. 2017).

## II. THE LEVEL OF ORDINARY SKILL IN THE ART

The level of ordinary skill in the art is the skill level of a hypothetical person who is presumed to have known the relevant art at the time of the invention. *In re GPAC*, 57 F.3d 1573, 1579 (Fed. Cir. 1995). In resolving the appropriate level of ordinary skill, courts consider the types of and solutions to problems encountered in the art, the speed of innovation, the sophistication of the technology, and the education of workers active in the field. *Id.* Importantly, “[a] person of ordinary skill in the art is also a person of ordinary creativity, not an automaton.” *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 421 (2007).

The parties generally agree on the level of ordinary skill in the art at the time of invention. Plaintiff’s expert asserts a skilled artisan “would have had a bachelor’s degree in electrical engineering, computer engineering, computer science, or a related field, and two to three years of experience in the design or development of wireless telecommunication systems, or the equivalent.”

Akl Decl., Dkt. No. 69-19 ¶ 25. Defendants’ expert asserts a skilled artisan

would have had at least an undergraduate degree in electrical engineering, computer science, or computer engineering, or a related field, and two years of experience in the design, development, and/or testing of cellular networks or equivalent combination of education and experience. . . . Such a person would have been familiar with the public discussion and proposals made as part of the 3GPP LTE standards-setting body.

Lanning Decl., Dkt. No. 75-3 ¶ 28. Neither party suggests the Court must resolve the material differences, if any, between these proffered skill levels to arrive at the correct constructions of the disputed terms.

### III. THE DISPUTED TERMS

#### A. “an OFDM multicarrier signal comprising a first plurality of subcarriers and a second plurality of subcarriers” (U.S. Patent 7,372,909, Claims 1, 5)

Plaintiff’s Construction	Defendants’ Construction
This portion of the preamble is limiting, and should be construed as: “an orthogonal frequency division multiplexed multicarrier signal comprising a first plurality of subcarriers and a second plurality of subcarriers.”	The disputed preamble language is limiting, and should be construed as “an orthogonal frequency division multiplexed multicarrier signal that is not time division multiplexed comprising a first plurality of subcarriers and a second plurality of subcarriers.”

The ’909 Patent relates to transmitters and receivers used in digital communication systems and, more particularly, to a system using a multicarrier communication scheme. ’909 Patent at 1:7–9. Typically, such systems have a data channel and a control channel, each with multiple subcarriers. *See id.* at 1:13–14. If the center frequency of the data channel is different than the center frequency of the control channel, the frequency of a local signal for generating the subcarriers must switch from one to the other. *Id.* at 1:32–39. Because of the nature of the circuit that generates the local signal, the local signal frequency takes time to stabilize. *See id.* at 1:52–57.

To address this, the patent teaches locating the control channel at the center frequency of the data-channel band. *See, e.g., id.* fig.10. Because the local-signal frequency of both the control and data channels would then be the same, there is no need to alter the local-signal frequency generator, and thus no need to wait for it to stabilize. This speeds up switching between the control channel and the data channel. *See generally id.* at 1:61–2:8.

Claim 1 of the ’909 Patent addresses this concept with its first limitation:

1. A radio transmitting apparatus, for transmitting an [orthogonal frequency-division multiplexing] OFDM multicarrier signal comprising a first plurality of subcarriers and a second plurality of subcarriers, said radio transmitting apparatus comprising:

an assigning section operable to assign a data channel to the first plurality of subcarriers of the multicarrier signal and to assign a control channel to the second plurality of subcarriers of the multicarrier signal, wherein the second plurality of subcarriers are located between the first plurality of subcarriers on a frequency axis and the center frequency of the data channel and the center frequency of the control channel are common . . . .

'909 Patent at 8:17–29; *see also id.* at 8:42–51 (Claim 5).

The parties' dispute concerns the preambles of Claims 1 and 5, which the parties agree is limiting. Defendants contend that during prosecution the applicant disclaimed any radio transmitting apparatus or method that uses time division multiplexing (TDM). Dkt. No. 75 at 2. According to Plaintiff, however, the applicant's statements during prosecution come "nowhere close to a 'clear and unmistakable' disavowal." Dkt. No. 69 at 3.

The relevant prosecution history concerns a rejection based on U.S. Patent 6,522,638 (Haugli), which "relates to a packet data communication system suitable for transferring data between a large number of mobile terminals and a central control station." '638 Patent at 1:8–10. Haugli explains that

[t]ypically, SCPC (a Single Carrier per Channel) techniques are employed for such systems. In SCPC . . . each active channel is assigned a single narrow band carrier, typically not more than 20 KHz wide. The assigned channel depends on availability and desired bit rate. Bit rates are typically 0.6, 4.8, 19.2, kilobits per second. When the control station wishes to send a message to the terminal, the targeted terminal is notified over a very low bit rate control channel that it should expect to receive a message on a particular frequency. The targeted terminal then tunes to that frequency in order to receive and decode the incoming message.

The need to assign a message channel over a control channel before passing the message also introduces a delay, known as latency, which makes it difficult to conduct interactive communications, for example, with the keyboard in real time.

'638 Patent at 1:45–57.

To address this, Haugli teaches assigning data packets to channels based on need. For example, “[d]ata packets can be sent on one channel or distributed simultaneously over several channels depending on the bandwidth requirements. For low bit rates, a single channel can be shared among several terminals.” *Id.* at 2:19–23. In that regard, the specification generally references the invention as a TDM system. *See, e.g., id. fig.2.*

At the time of the rejection, Claim 1 recited:

1. A radio transmitting apparatus comprising:
  - an assigning section that assigns a plurality of subcarriers to a data channel, assigns fewer subcarriers than said plurality of subcarriers to a control channel, and locates said control channel at a center frequency of a frequency band used to transmit said data channel; and
  - a transmitting section that transmits a multicarrier signal including the subcarriers assigned by said assigning section.

*See* ’909 Prosecution History, Dkt. No. 75-4 at 6. The examiner, however, rejected Claim 1 (and other claims) as anticipated by Haugli. *See id.* According to the examiner, Fig. 3 of Haugli taught both the recited “assigning section” (item 20 of Haugli) and the “transmitting section” (items 21, 22, 25, 27 of Haugli). *Id.*

In response to the rejection, the applicant cancelled all then-pending claims and added new Claims 21–26.<sup>1</sup> *Id.* at 21–23. In his accompanying remarks, the applicant explained:

Haugli discloses TDM transmission in which a single control channel is located between data channels on a frequency axis in a frequency domain, as shown in Fig. 2, with the control channel being centered in the center of the received band. . . . Haugli does not disclose an up-conversion section operable to up-convert the multicarrier signal to a carrier frequency. The new claims emphasize differences over Haugli in that, *inter alia*, they are directed to an OFDM radio transmitting

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<sup>1</sup> Claim 21 ultimately issued as Claim 1 without amendment. *Compare* ’909 Prosecution History, Dkt. No. 75-4 at 21, *with* ’909 Patent at 8:17–33.

apparatus and method. As noted above, the technique of Haugli's Figs. 2 and 3, by contrast, relates to a TDM system.

*Id.* at 25–26; *see also id.* at 50 (same). Thus, the applicant made two distinctions relative to Haugli: (1) “Haugli does not disclose an up-conversion section,” and (2) the new claims emphasize the difference between the applicant’s OFDM radio transmitting apparatus and method and Haugli’s “TDM system.”

Defendants’ position is centered on the second, broader distinction. They argue that, rather than contrasting the then-pending claims with Haugli’s “TDM system,” “[t]he Applicant could have—but chose not to—distinguish Haugli based only on its failure to use . . . OFDM.” Dkt. No. 75 at 4.

But the applicant’s remarks concerning “a TDM system” are too vague to support disclaimer. The applicant merely suggested the new claims “emphasize[d] the differences” between the two systems, without specifically articulating what those differences were (other than that Haugli does not disclose an up-conversion section). The applicant did *not* argue the new claims were patentable because they did not recite TDM, nor did he suggest that his OFDM system was incompatible with TDM. Thus, these statements are not clear and unmistakable enough to hold the applicant disclaimed a system or method that implements TDM. There is no disclaimer here, and the Court will give this term its plain and ordinary meaning.

**B. “guard time during which nothing is transmitted” (U.S. Patent 8,077,594, Claims 1, 13)**

Plaintiff’s Construction	Defendants’ Construction
“the guard time during which nothing is transmitted by the device transmitting the random access preamble”	“the guard time during which nothing except the SRS is transmitted”

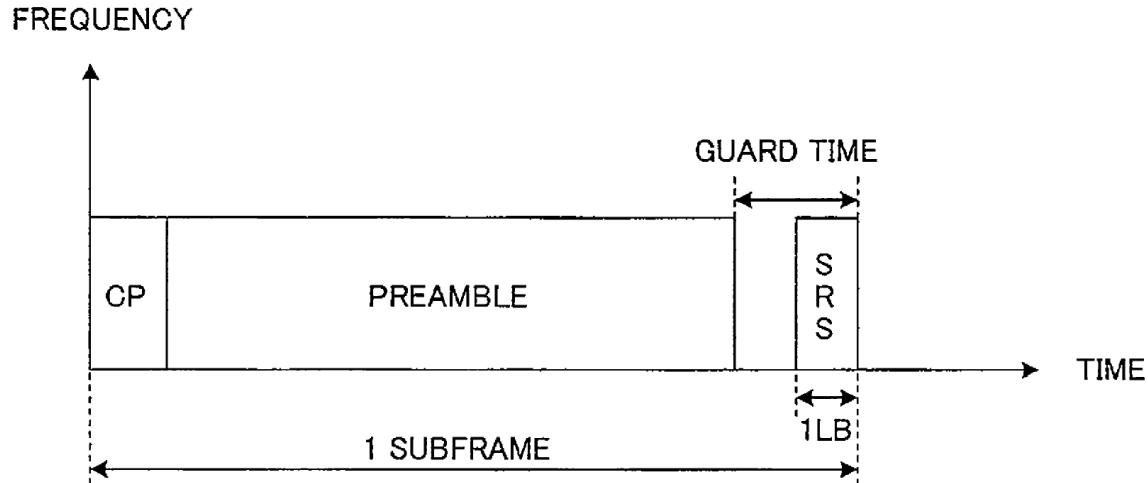
The '594 Patent relates to the timing, in a radio communications network, of “random access preambles” sent by some devices relative to the timing of “sounding reference signals” (SRSs) sent by other devices. Preambles are used “for initial access of a mobile station, updating of transmission timing and [channel quality] estimation on uplink from a mobile station to a base station.” '594 Patent at 1:41–43. Concerning the “initial access” function, devices not yet synchronized with a base station use “guard times”—periods of non-transmission following the preamble—to prevent the preamble from interfering with the next transmission field—i.e., subframe. *Id.* at 1:63–2:3; *see also id.* at 1:53–54 (explaining a guard time “is a non-transmission period”).

SRSs are used for channel quality estimation, as well as “frequency scheduling, reception timing, detection and transmission power control.” '594 Patent at 1:12–16. Connected mobile stations transmit SRSs to the base station periodically, although the nature of the SRS can vary depending on the location of the mobile device relative to the base station. *See id.* at 1:25–38 (explaining when wideband versus narrowband SRSs maybe used).

At the time of the patent, SRSs were typically transmitted to base stations early in a subframe, at the same time other devices might sending preambles. *See '594 Patent at 2:28–30.* In such an arrangement, as the number of devices on (and attempting connection to) a network increases, available resources decrease as more devices transmit at the same time. *Id.* at 2:30–39. To address that problem, the patent teaches transmitting SRSs later in the subframe, during the portion of the subframe coinciding with the guard time of devices sending preambles.

FIG. 5 (below) shows an embodiment of a preamble transmission time field. '594 Patent at 3:10–12. In the figure, different mobile stations transmit the preamble and the SRS. *Id.* at 7:3–5. The mobile station sending the preamble has not yet established a connection with the base station, *id.* at 7:5–9, but the mobile station sending the SRS has, and “arranges the SRS at the tail

end of the subframe,” *id.* at 7:17–18.



**Fig. 5 of U.S. Patent 8,077,594**

Alternatively, the patent suggests the same mobile station could transmit both the preamble and an SRS. '594 Patent at 13:19–23 (“the mobile station may arrange an SRS in a guard time of a preamble to be transmitted in the preamble transmission field that matches the SRS transmission field and simultaneously transmit the preamble and the SRS arranged in the guard time of the preamble”). The patent, however, does not describe such an embodiment in detail. Nor does the patent explain why this would be desirable given the different purposes of the SRS and a preamble followed by a guard time—that is, why a device not yet synchronized would also send an SRS as if it were already connected.

Each of the '594 Patent's independent claims, which are written from the perspective of a base station, includes the disputed phrase. For example, Claim 1 recites:

1. A base station apparatus comprising:
  - a receiving unit configured to receive a Sounding Reference Signal (SRS) that is mapped to a position of a guard time in a subframe, in which a random access preamble is transmitted, and that is transmitted from a mobile station apparatus, *the*

*guard time during which nothing is transmitted being added to the last of the random access preamble, and a cyclic prefix being added to the beginning of the random access preamble; and*

a demodulating unit configured to demodulate the received SRS, wherein the random access preamble is a preamble sequence selected from a set of preamble sequences, and wherein the guard time is of a given time length.

'594 Patent at 14:6–19 (emphasis added). Method Claim 13 recites similar steps. *Id.* at 14:52–63.

Defendants characterize the dispute as “whether the claim covers an embodiment in which the same UE transmits a random access preamble and then an SRS during the same guard time following the random access preamble.” Dkt. No. 75 at 6. They argue Plaintiff’s construction is contrary to the plain language of the claims and principles of claim differentiation, and that Plaintiff’s construction reads out an embodiment. *Id.* at 7–8 (citing '594 Patent at 13:19–23). Plaintiff focuses on the claim language and, in particular, the disputed phrase itself. Dkt. No. 69 at 9–10.

To start, the claim language supports Plaintiff’s position. Most notably, the claims specify that “the guard time during which nothing is transmitted” is *added to* the end of the preamble. According to the plain meaning of that language, “nothing is transmitted” during that guard time, much less an SRS by the same mobile unit.

To rebut this interpretation of the claim language, Defendants argue the disputed phrase is definitional—that the applicants were explaining the meaning of “guard time” in the claim—but its position in the limitation suggests otherwise. One would expect definitional language to come near the first use of the term being defined. Here, however, the claims use “guard time” earlier as if that term has a well-known meaning, which it did. *See, e.g.*, '594 Patent at 1:50–54.

Tellingly, Defendants’ position would be stronger if the disputed phrase were simply not in

the claim—for example, if the limitation recited

a receiving unit configured to receive a Sounding Reference Signal (SRS) that is mapped to a position of a guard time in a subframe, in which a random access preamble is transmitted, and that is transmitted from a mobile station apparatus, *the guard time during which nothing is transmitted being added to the last of the random access preamble, and a cyclic prefix being added to the beginning of the random access preamble;* and

Yet the applicants chose to add extensive additional language to the limitation for some reason.

Defendants also contend nothing in the claim language eliminates, from the scope of the independent claims, a disclosed embodiment in which one station transmits both a preamble and an SRS. Dkt. No. 75 at 7 (citing '594 Patent at 13:19–23; H'rg Tr. (Apr. 25, 2022), Dkt. No. 107 at 69:17–18. That position, however, depends on accepting that the disputed phrase defines guard time, a notion the Court has rejected. Moreover, there is no requirement that claims cover all disclosed embodiments,<sup>2</sup> and the claim language here outweighs any such presumption to that effect. *See TIP Sys., LLC v. Phillips & Brooks/Gladwin, Inc.*, 529 F.3d 1364, 1373 (Fed. Cir. 2008) (explaining “the mere fact that there is an alternative embodiment . . . that is not encompassed by district court’s claim construction does not [necessarily] outweigh the language of the claim”).

Defendants also argue claim differentiation—specifically, that because Claim 5 requires the receiving unit to “receive[] the random access preamble transmitted from another mobile

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<sup>2</sup> That the applicants might not have intended to cover an embodiment in which the same device sends both a preamble and an SRS in the same subframe is not unreasonable given the “embodiment” is described, in total, in one sentence near the end of the specification. In fact, the patent fails to explain why one device would send both a preamble and SRS in the same subframe given their distinctly different purposes—the former for initial access and the latter for channel quality estimation by a device already connected to a base station. *See* '594 Patent at 1:41–43; *id.* at 1:12–16.

station apparatus,” Plaintiff’s construction would render that claim meaningless. Dkt. No. 75 at 8. Regardless, the apparatus of Claim 1 is “configured to receive” the SRS, whereas the apparatus of Claim 5 receives the preamble from the other mobile station. Thus, claim differentiation is not inconsistent with Plaintiff’s construction. But even if it were a closer call, “claim differentiation is ‘not a hard and fast rule and will be overcome by a contrary construction dictated by the written description or prosecution history.’” *Regents of Univ. of Cal. v. Dakocytomation Cal., Inc.*, 517 F.3d 1364, 1375 (Fed. Cir. 2008) (quoting *Seachange Int’l, Inc. v. C-COR, Inc.*, 413 F.3d 1361, 1369 (Fed. Cir. 2005)).

Here, the well-understood meaning of “during which nothing is transmitted” controls. Accordingly, the Court adopts Plaintiff’s construction.

### C. “subframe” (’594 Patent, Claims 1, 2, 7, 9, 10, 13)

Plaintiff’s Construction	Defendants’ Construction
Plain and ordinary meaning.	a 1 millisecond time period in a frame

Relying on three excerpts from the Background Art section, Defendants contend the ’594 Patent defines “subframe” as set forth in their construction. Dkt. No. 75 at 9 (citing ’594 Patent at 1:26–27 (“at 1-subframe intervals = at 1 ms intervals”); *id.* at 2:7 (“one subframe (= 1 ms)”); *id.* at 1:55–56 (“10-subframe interfaces = 10 ms intervals”)). The Court, however, does not find these excerpts definitional.

“To act as its own lexicographer, a patentee must ‘clearly set forth a definition of the disputed claim term’ other than its plain and ordinary meaning.” *Thorner v. Entm’t Am. LLC*, 669 F.3d 1362, 1365 (Fed. Cir. 2012) (quoting *CCS Fitness, Inc. v. Brunswick Corp.*, 288 F.3d 1359, 1366 (Fed. Cir. 2002)). In other words, “the patentee must ‘clearly express an intent’ to redefine the term. *Id.* (quoting *Helmsderfer v. Bobrick Washroom Equip., Inc.*, 527 F.3d 1379, 1381 (Fed.

Cir. 2008)).

Here, there is no such clearly expressed intent. The Detailed Description contains no mention of specific timing. *See, e.g.*, '594 Patent figs.4–5, 7, 10–11. In fact, everywhere the patent describes the subframe as a 1-millisecond time frame relates to conventional 3GPP RAN LTE. *See, e.g., id.* at 2:11–23 (referencing three non-patent documents, each of which concerns 3GPP standards). Because it is at least reasonable that the applicants were simply describing the conventional art rather than clearly and unambiguously expressing an intent to define the term, the Court holds there is no lexicography here.

- D. “a plurality of sequences, which are indexed by the indices having consecutive numbers in order of generally increasing to a maximum value and then decreasing, from the maximum value, a required cyclic shift amount according to a sequence number” (U.S. Patent 8,085,724, Claims 12, 18)**

Plaintiff’s Construction	Defendants’ Construction
“a plurality of sequences, which are indexed by the indices having consecutive numbers, such that the sequences are indexed in order of generally increasing required cyclic shift amount to a maximum value and then generally decreasing required cyclic shift amount from the maximum value”	Indefinite

The '724 Patent relates to a method and apparatus that reports a Zadoff-Chu [ZC] sequence or GCL (Generalized Chirp-Like) sequence allocated to a cell. '724 Patent at 1:6–9. Generally, ZC and GCL sequences involve cyclically shifting signals to improve reliability and reduce reception errors caused by collisions of signals from multiple devices. *See generally* Akl Decl., Dkt. No. 69-19 ¶¶ 33–34 (noting “[i]deally, the similarity between different sequences is low so that they can be easily distinguished by a receiving device”).

Specifically, the patent teaches correlating consecutive indexes to different code sequences and allocating the sequences to cells within a network. '724 Patent at 2:62–64. This allows the

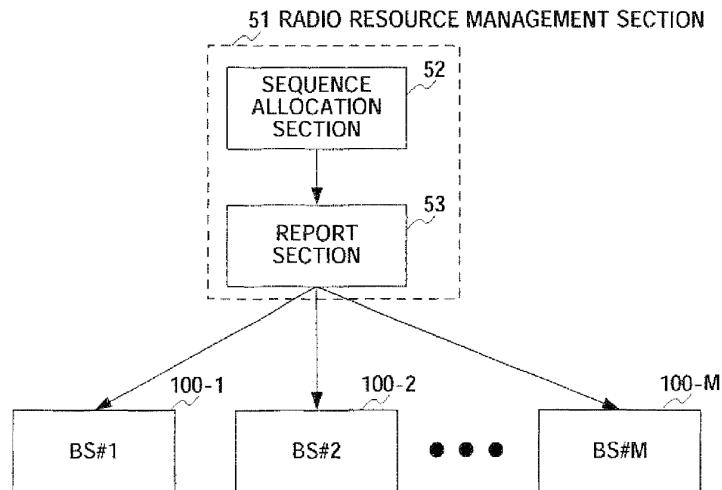
shorter indexes to be transmitted rather than the sequences themselves, thus reducing the number of bits that must be used to convey information. This makes for more efficient use of available bandwidth. *See generally id.* at 9:24–40 (explaining Embodiment 1 enables the signaling amount to be reduced by up to 97.5%).

Together, FIG. 1 and FIG 5 show how this works. As shown in FIG. 1 (below):

Sequence allocation section 52 [of a radio resource management section 51] allocates ZC sequence number r to a cell managed by a subordinate [base station] BS, and outputs allocated sequence number r to report section 53. Report section 53 reports information indicating sequence number r output from sequence allocation section 52 to plurality of BS's 100-1 through 100-M. . . .

Based on information indicating sequence number r reported from report section 53, BS's 100-1 through 100-M report allocation sequence information to a [user equipment] UE within their own cell . . . .

'724 Patent at 5:19–33.



**FIG. 1 of the '724 Patent**

"[S]equences are allocated to each cell in accordance with the table shown in FIG. 5 so that indexes are consecutive." *Id.* at 8:22–27.

INDEX	SEQUENCE NUMBER (r)
1	1
2	N-1
3	2
4	N-2
5	3
6	N-3
⋮	⋮
N-4	(N-1)/2-1
N-3	N-((N-1)/2-1)
N-2	(N-1)/2
N-1	N-((N-1)/2)

**FIG. 5 of the '724 Patent**

But even though “indexes are consecutive” in the table, sequence numbers are normally not allocated consecutively. In fact, another figure related to Embodiment 1 shows the relationship of the sequence numbers to the indices may be arbitrary. '724 Patent fig.9.

Things get more complicated when UEs are moving, especially at high speeds. Describing Embodiment 6, the patent explains:

[W]hen UE's moving at high speed are present and cyclic shift sequences with different cyclic shift amounts are employed within the same cell, high-speed-movement related Doppler spread and frequency offset are involved in a received signal, and therefore a high correlation value occurs in a detection range of separate cyclic shift sequences generated from the same ZC sequence—that is, at a wrong timing position. On the other hand, a correlation value in an expected detection range decreases.

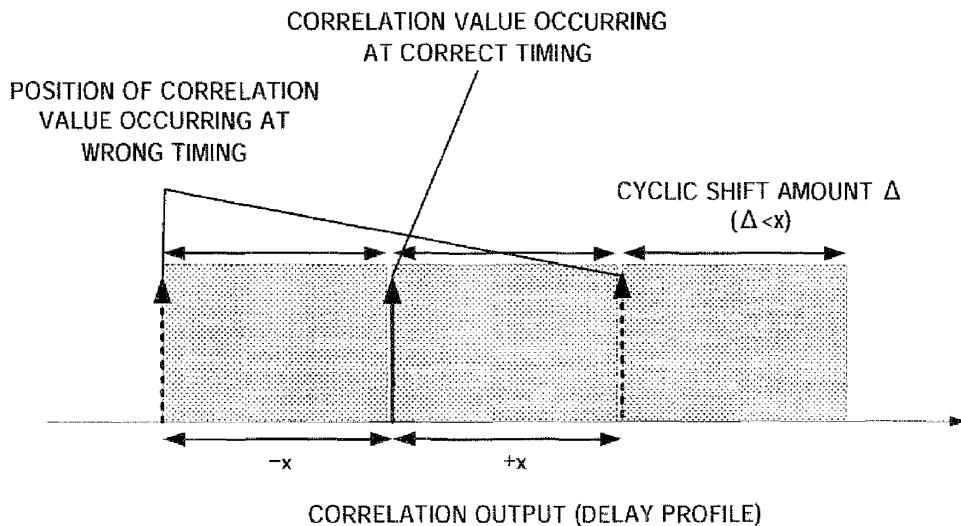
When a high correlation value occurs in a detection range of different cyclic shift sequences, the false detection probability for different cyclic shift sequences increases. Also, when a correlation value in an expected detection range decreases, the detection probability of a transmitted preamble becomes lower.

'724 Patent at 17:47–61. That is, quickly moving devices have an increased chance of detecting the wrong signal.

FIG. 21 and the related text explain the problem in more detail:

[W]ith regard to a correlation value for a preamble transmitted from a UE when moving at high speed, a correlation value peak occurs at timing that is wrong in a + direction or - direction equivalent to timing  $x$  corresponding to a sequence number of a ZC sequence . . . with respect to timing of a correlation value detected when there is no Doppler spread or frequency offset transmitted from a stationary UE. Generally, . . . an erroneous correlation value peak increases while a correct-timing peak value decreases as the speed of movement of a UE increases. Therefore, if a set cyclic shift amount  $\Delta$  value is greater than  $x$  ( $\Delta > x$ ), erroneous detection occurs in peak detection processing by a base station, and it is therefore necessary for cyclic shift amount  $\Delta$  to be set to a value smaller than  $x$  ( $\Delta < x$ ).

'724 Patent at 13:62–14:12.



**FIG. 21 of the '724 Patent**

To help address this problem, the patent teaches two constraints on the amount of cyclic shift with respect to Embodiment 6. First, “it is necessary for the condition cyclic shift amount  $\Delta <$  relative difference  $x$  to be satisfied.” '724 Patent at 19:11–21. This ensures that “a correlation value that occurs at correct timing and a correlation value that occurs at a wrong timing do not mutually overlap,” which prevents erroneous detection of a preamble. *Id.* at 19:18–21. Second, “required cyclic shift amount  $\Delta$ ,” according to the specification, is greater than  $2 \times T_{\text{RoundTripDelay}} +$

T<sub>DelaySpread</sub>. *Id.* at 19:26–33. While the first constraint is a ceiling on the cyclic shift amount  $\Delta$ , the second is a floor. *See id.* at 19:33–36.

The parties’ dispute concerns a term of degree found in Claims 12 and 18, which relate to Embodiment 6 by referencing the “required cyclic shift amount.” Specifically, each claim requires “allocating at least one of sequences with consecutive indices among a plurality of sequences, which are indexed by the indices having consecutive numbers in order of generally increasing to a maximum value and then decreasing, from the maximum value, a required cyclic shift amount according to a sequence number.” ’724 Patent at 22:55–60 (Claim 18); *see also id.* at 22:23–29 (requiring, in Claim 12, “an allocating section configured to allocate . . .”).

Defendants challenge the claims’ recitation of “generally increasing” as indefinite. More specifically, they assert the phrase “would not have had a readily discernable meaning to a POSITA.” Dkt. No. 75 at 13 (citing Mahon Decl., Dkt. No. 75-1 ¶ 63). This is evidenced, say Defendants, by the parties’ collective submission of five allegedly different interpretations of the language. *Id.*

Plaintiff, on the other hand, argues the term is not indefinite, and simply “refers to something that increases with possible periods of staying the same, but does not decrease.” Dkt. No. 69 at 19; *see also* Akl Decl., Dkt. No. 69-19 ¶ 54 (“‘generally’ increasing” refers to something that increases or stays the same, but does not decrease”). Its position focuses on FIGS. 23–24, which show the relationship between indices, sequence numbers, and “maximum applicable cyclic shift amount” for Embodiment 6 according to Equations (6) and (7), respectively. With reference to FIG. 23, in which the “maximum applicable cyclic shift amount  $\Delta$ ” first increases and then decreases for each consecutive index, the patent explains the values

are arranged in *ascending order and descending order*—that is, sequence numbers are *arranged in an order proportional to the cell radius*—and therefore even if N sequences are allocated consecutively, it is easy to perform allocation so that a sequence that cannot be utilized due to cell radius constraints is not included.

'724 Patent at 19:38–56 (emphasis added). In FIG. 24, the cyclic shift amount increases every two indices.

Neither party contends “generally increasing” has any special meaning to a skilled artisan, so resolving the correct construction “involves little more than the application of the widely accepted meaning of commonly understood words.” *See Phillips*, 415 F.3d at 1314. “Generally” means “usually” or “for the most part.” <https://www.yourdictionary.com/generally>; *see also general*, The New Shorter Oxford English Dict., Dkt. No. 75-5 at 1073. In the context of the claims at issue, “generally increasing” could mean (1) increasing on average over the number of indices, Mahon Decl., Dkt. No. 69-20 ¶ 66; (2) increasing relative to a prior index more often than decreasing relative to a prior index, *id.*; or (3) as Plaintiff urges, increasing or staying the same, Dkt. No. 69 at 19; Akl Decl., Dkt. No. 69-19 ¶ 54. But nothing in the disclosure provides context for how a skilled artisan should understand which of these meanings applies. Moreover, contrary to Plaintiff’s construction, nothing about “generally increasing” excludes the possibility of *some* decrease. Accordingly, a skilled artisan would not have reasonable certainty about the scope of “generally increasing” based on the ordinary meaning of that phrase.

The patent record is consistent with this conclusion. The claims on their face provide no guidance about the scope of the term, and there is no express definition of the term in the specification. Plaintiff relies extensively on FIGS. 23–24, but its arguments are not persuasive. For one, neither figure refers to the “required cyclic shift amount” recited by the claims, but rather to the “*maximum applicable* cyclic shift amount.” As noted *supra*, these are different things, which alone

reduces the probative value of FIGS. 23–24 in discerning the scope of the term.<sup>3</sup>

But even if a link could be drawn between the *required* cyclic shift of the claims and the *maximum applicable* cyclic shift shown in FIGS. 23–24, nothing in the related text sheds light on the scope of “generally increasing.” With reference to FIG. 23, there’s nothing “general” about the increasing nature of the cyclic shift. To the contrary, it’s very specific: “arranged in ascending order and descending order” and “in an order proportional to the cell radius.” ’724 Patent at 19:38–42. FIG. 24 also depends on a precise formula, Equation (7).

In fact, Plaintiff’s “construction” of “generally increasing” underscores the problem. It suggests the term means “something that increases with possible periods of staying the same, but does not decrease.” Similarly, Plaintiff’s expert declares that, “[i]n the context of the claims, a POSITA would understand that ‘‘generally’ increasing’ refers to something that increases or stays the same.” Akl Decl., Dkt. No. 69-19 ¶ 54.<sup>4</sup> But as Defendants note in their response, these interpretations would encompass, after an initial increase, no further increases in required cyclic shift amount. Dkt. No. 75 at 13 n.4. While such a relationship between indices and shift amounts might be “generally staying the same,” it cannot be reasonably characterized as “generally increasing” on this record.

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<sup>3</sup> Claims 15–16 also recognize this distinction by limiting the required cyclic shift amount to “a maximum cyclic shift amount.” ’724 Patent at 22:38–41.

<sup>4</sup> Notably, the basis for Dr. Akl’s conclusion is not a POSITA’s knowledge, but FIG. 24 of the patent, which he characterizes as “an example of arranging sequences in order of generally increasing required cyclic shift amount.” Akl Decl., Dkt. No. 69-19 ¶ 54. He concludes FIG. 24 “illustrates indexing the sequences in order of generally increasing required cyclic shift amount,” *id.*, but “generally” is not used when describing FIG. 24. Rather, the only description of the arrangement of FIG. 24 is Equation 7, which is precise. *See* ’724 Patent at 20:4–6. In essence, Dr. Akl picks an embodiment from the specification, maps it to the claim language, and then treats it as definitional. This, of course, is not the correct method for determining claim scope.

To be clear, Defendants do not contest that FIG. 24 falls within the scope of the claims. Their issue is determining what does *not* fall within the scope of the claims. Although terms of degree are not inherently indefinite, *see Sonix Tech. Co. v. Publ'ns Int'l, Ltd.*, 844 F.3d 1370, 1377 (Fed. Cir. 2017), they must “afford clear notice of what is claimed,” *One-E-Way, Inc. v. I.T.C.*, 859 F.3d 1059, 1063 (Fed. Cir. 2017). Ultimately there must be some standard for measuring the term of degree, and where the objective boundary for the claim begins and ends. *See Biosig Instruments, Inc. v. Nautilus, Inc.*, 783 F.3d 1374, 1378 (Fed. Cir. 2015). Because neither Claim 12 nor Claim 18 provide such an objective boundary, they are indefinite.

**E. “a required cyclic shift amount according to a sequence number” (’724 Patent, Claims 12, 18); “the required cyclic shift amount is a required cyclic shift amount for a mobile station moving at high speed” (’724 Patent, Claim 13)**

Plaintiff’s Construction	Defendants’ Construction
Not indefinite. “an amount of a cyclic shift that is required in a cell” <sup>5</sup>	Indefinite

Defendants challenge these terms as indefinite, characterizing them as “purely subjective.” Dkt. No. 75 at 17. They contend the required cyclic shift amount “would have varied from one POSITA to another, depending on their subjective goals and the particular application.” *Id.* As such, “a POSITA would have needed to consult the ’724 patent’s specification to ascertain an objective boundary for a ‘required cyclic shift amount according to a sequence number’ [as recited in Claims 12 and 18] or a ‘required cyclic shift amount for a mobile station moving at high speed’ [as recited in Claim 13].” *Id.*

Plaintiff counters that “required cyclic shift” in the context of the patent refers to a cyclic

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<sup>5</sup> Dkt. No. 69 at 21.

shift amount required by a base station. Dkt. No. 69 at 20. It also contends Defendants misread the claim language, because “according to a sequence number” refers to how the sequences are indexed, along with their required cyclic shifts. Dkt. No. 69 at 22.

“Required cyclic shift amount” in Claims 12 and 18 is not indefinite. The specification provides an equation for the term. *See* ’724 Patent at 19:26–33. Moreover, as Plaintiff suggests, “according to a sequence number” refers to how the allocation is made—that is, by sequence numbers of sequences rather than the sequences themselves—which is supported by the figures. *See, e.g., id.* at 19:62–65 (noting “FIG. 24 shows an example of a preamble sequence table that satisfies Equation (7),” which correlates indices with sequence numbers  $r$ ). Thus, the Court rejects Defendants’ contention that “required cyclic shift amount” must depend on the sequence number.<sup>6</sup>

Nor is the use of “required cyclic shift amount” in Claim 13 indefinite. That claim limits “the required cyclic shift amount” to that required for a mobile station moving at high speed. Defendants contend a skilled artisan “would have recognized ‘required cyclic shift amount’ to depend entirely and exclusively on the geography of the cell,” Dkt. No. 75 at 18, but the required cyclic shift amount also depends on the propagation delay, which itself is a function of the position between the base station and the UE, which position in turn depends on speed. While it may be a difficult calculation to make, that does not make the term indefinite. Accordingly, the Court concludes Defendants have not shown by clear and convincing evidence a skilled artisan would not

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<sup>6</sup> Defendants argue that interpreting the phrase “according to a sequence number” in this way improperly rewrites the claim to avoid indefiniteness. Dkt. No. 75 at 20 n.7. To the contrary, the claims cannot be interpreted otherwise given that “required cyclic shift amount,” as explained in the specification, depends only on  $T_{RoundTripDelay}$  and  $T_{DelaySpread}$ , and *not* on sequence number  $r$ . ’724 Patent at 19:26–33. Similarly, the meaning of “sequence number” is clear from the specification.

understand the scope of Claim 13.

F.     **“the aperiodic channel quality indicator report is multiplexed with data transmitted by the mobile terminal” / “the aperiodic channel quality indicator report is not multiplexed with data transmitted by the mobile terminal” (U.S. Patent 8,385,239, Claim 14)**

Plaintiff’s Construction	Defendants’ Construction
“the aperiodic channel quality indicator report is multiplexed with user data transmitted by the mobile terminal” / “the aperiodic channel quality indicator report is not multiplexed with user data transmitted by the mobile terminal”	Plain and ordinary meaning of the term “with data”

The ’239 Patent explains the need, in wireless communication systems, for mobile stations to inform the base stations of prevalent channel conditions. Information about those conditions include standard indicators named Channel Quality Indicator (CQI), Precoding Matrix Indicator (PMI) and Rank Indicator (RI), which are reported either periodically or aperiodically. ’239 Patent at 2:40–45; *see also id.* at 6:52. For periodic information, the patent discloses multiplexing the indicators with user data. Aperiodic indication is triggered by the base station, and the patent teaches not multiplexing certain reports even if there is no data to transmit, for “improved control on the content and error resilience of the aperiodic CQI report.” *Id.* at 9:30–37.

The disputed term appears in Claim 14, which is directed to a base station with:

a receiver configured to receive from the mobile terminal the aperiodic channel quality indicator report when the channel quality indicator trigger is set, wherein the aperiodic channel quality indicator report is not multiplexed with data transmitted by the mobile terminal via an Uplink Shared Channel (UL-SCH) in case when the control channel signal indicates a determined value of the MCS Index and also indicates a number of resource blocks that is smaller than or equal to a determined number of resource blocks, and wherein the aperiodic channel quality indicator report is multiplexed with data transmitted by the mobile

terminal via the UL-SCH, in case (a) when the control channel signal does not indicate the determined value of the MCS Index, or in case (b) when the control channel does not indicate a number of resource blocks that is smaller than or equal to the determined number of resource blocks.

*Id.* at 23:31–24:20.

This dispute centers on the meaning of “data.” Relying in part on a previous claim construction opinion from a different case, Plaintiff contends “data” should be construed as “user data.” Dkt. No. 69 at 23 (citing *Godo Kaisha IP Bridge 1 v. TCL Commc’n Tech. Holdings Ltd.*, 249 F. Supp. 3d 767, 780 (D. Del. 2017)). Plaintiff also relies on several excerpts from the patent specifically referring to “user data.” Dkt. No. 69 at 24–25 (citing ’239 Patent at [57], 13:65–14:5, 14:30–37, 10:56–61, 9:51–54, 14:15–56). Defendants respond that “data” has a plain and ordinary meaning, which includes both “control data” and “user data,” and there is no lexicography or disavowal to narrow the scope of the term. Dkt. No. 75 at 23. Moreover, say Defendants, the prosecution history contradicts Plaintiff’s construction by distinguishing “user data” in some claims with simply “data” in other claims. *Id.* at 26 (comparing Claim 30 with Claim 50).

The patent does not refer to “control data.” Instead, the written description refers to “control information” or “control signaling” when discussing the various indicators. *See, e.g.*, ’239 Patent at 5:11–12 (referring to “L1/L2 control information”); *id.* at 5:16 (noting “there may be a UE Identity (UE ID) comprised in the control signaling”); *id.* figs.2–3 (distinguishing between “control” and “data” sections of a subframe). Moreover, the prosecution history supports this distinction between “data” and “control information” by equating “user data” with “data to be transmitted via an Uplink Shared Channel (UL-SCH).” Dkt. No. 75 at 26 (citing Dkt. No. 75-5)). Thus, regardless of whether “data” is properly construed as “user data,” the intrinsic record clearly differentiates between “control information” and “data.”

Regardless, Claim 14 only refers to “data,” not “user data.” The former does not have a special meaning in the art or in the context described in the ’239 Patent, but it does not include control information or control signals. Accordingly, the Court will give this term its plain and ordinary meaning, *which excludes control information or control signals*.

#### G. “subcarrier block” (U.S. Patent 9,137,000, Claims 1, 11)

Plaintiff’s Construction	Defendants’ Construction
Plain and ordinary meaning.	“unit of resource allocation comprising consecutive subcarriers collected together”

Prior to the hearing, the Court preliminarily construed this term as “plurality of subcarriers collected together.” During the hearing, the parties agreed to that preliminary construction. H’rg Tr. (Apr. 25, 2022), Dkt. No. 107 at 98:15–25. The Court therefore adopts that preliminary construction.

#### IV. CONCLUSION

Term	The Court’s Construction
“an OFDM multicarrier signal comprising a first plurality of subcarriers and a second plurality of subcarriers” (U.S. Patent 7,372,909, Claims 1, 5)	Plain and ordinary meaning.
“guard time during which nothing is transmitted” (U.S. Patent 8,077,594, Claims 1, 13)	“the guard time during which nothing is transmitted by the device transmitting the random access preamble”
“subframe” (’594 Patent, Claims 1, 2, 7, 9, 10, 13)	Plain and ordinary meaning.

<p>“a plurality of sequences, which are indexed by the indices having consecutive numbers in order of generally increasing to a maximum value and then decreasing, from the maximum value, a required cyclic shift amount according to a sequence number”</p> <p>(U.S. Patent 8,085,724, Claims 12, 18)</p>	<p>Indefinite.</p>
<p>“a required cyclic shift amount according to a sequence number”</p> <p>(’724 Patent, Claims 12, 18);</p> <p>“the required cyclic shift amount is a required cyclic shift amount for a mobile station moving at high speed”</p> <p>(’724 Patent, Claim 13)</p>	<p>Not indefinite.</p>
<p>“the aperiodic channel quality indicator report is multiplexed with data transmitted by the mobile terminal”/ “the aperiodic channel quality indicator report is not multiplexed with data transmitted by the mobile terminal”</p> <p>(U.S. Patent 8,385,239, Claim 14)</p>	<p>Plain and ordinary meaning.</p>
<p>“subcarrier block”</p> <p>(U.S. Patent 9,137,000, Claims 1, 11)</p>	<p>“plurality of subcarriers collected together”</p>

The Court **ORDERS** each party not to refer, directly or indirectly, to its own or any other party’s claim-construction positions in the presence of the jury. Likewise, the Court **ORDERS** the parties to refrain from mentioning any part of this opinion, other than the actual positions adopted by the Court, in the presence of the jury. Neither party may take a position before the jury that

contradicts the Court's reasoning in this opinion. Any reference to claim construction proceedings is limited to informing the jury of the positions adopted by the Court.

**SIGNED this 14th day of June, 2022.**



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ROY S. PAYNE  
UNITED STATES MAGISTRATE JUDGE